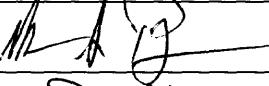
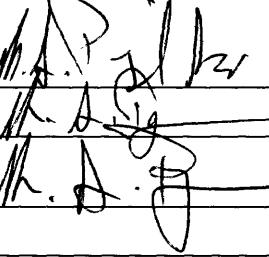
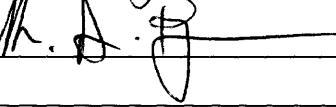


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1. Title: <u>Loss of fluid Test (LOFT) Characterization Study</u>				
2. Index Codes: Building/Type <u>TAN-630/650</u> SSC ID _____ Site Area <u>TAN</u>				
3. NPH Performance Category: _____ or <input checked="" type="checkbox"/> N/A				
4. EDF Safety Category: _____ or <input checked="" type="checkbox"/> N/A SCC Safety Category: _____ or <input checked="" type="checkbox"/> N/A				
5. Summary: Documentation of the characterization activities that have taken place in the Loss of Fluid Test facility in preparation for demolition.				
6. Review (R) and Approval (A) and Acceptance (Ac) Signatures: (See instructions for definitions of terms and significance of signatures.)				
	R/A	Typed Name/Organization	Signature	Date
Performer/ Author		Terri Cornett		12/5/05
Technical Checker		Marcus Pinzel		12.41.05
Independent Peer Reviewer (if applicable)		David Hutchison <i>per telecon</i>		12.41.05
Approver		Thomas Dogal <i>per e-mail</i>		12.41.05
E&RS Director Review		Kliss McNeel <i>per telecon</i>		12.41.05
Doc. Control				
7. Distribution: (Name and Mail Stop)		Hoss Brown MS 9208, Terri Cornett MS 9206, Marcus Pinzel MS 9206, Kliss McNeel MS 3211, David Hutchison MS 4110, Thomas Dogal MS 9208		
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13. Registered Professional Engineer's Stamp (if required)

Loss of Fluid Test Characterization Study

1. Characterization of TAN-630 and TAN-650

Characterization of the TAN-630 and TAN-650 facilities was performed during 2004 and 2005 (Rybicki and Osborne, undated). TAN-630 and TAN-650 were evaluated for potential waste streams through interviewing former LOFT personnel, reviewing historical characterization and other related documentation and drawings, and conducting a room-by-room inspection. Based on the information gathered, the potential exists for low-level radioactive waste (LLW), and demolition waste. A majority of the radioactive waste was removed during inactivation of the facility (INEL 1987). There were no known processes at TAN-630 and TAN-650 that would have generated RCRA listed waste as defined in 40 CFR Part 261, Subpart D. A mercury spill occurred in 1988 during deactivation of the ANP project jet engines. This Resource Conservation and Recovery (RCRA) Closure was completed under a Voluntary Consent Order (VCO) and is summarized below.

During 2004 and 2005, radiological surveys of TAN-630 and TAN-650 were conducted and documented on radiological survey maps. Based on a review of the historical documentation, past radiological surveys, and the surveys conducted in 2004 and 2005, it has been determined that there is no radiological contamination in TAN-630. During dismantlement and demolition activities, equipment and components removed from TAN-630 and TAN-650 will undergo additional radiological surveys as a final confirmation. TAN-630 and TAN-650 were further evaluated on a room-by-room basis to identify items that should be excessed, recycled, or otherwise managed as waste during demolition. Also during 2004 and 2005, major system components at TAN-630 and TAN-650 were either removed or decontaminated. RCRA regulated components (e.g., silver and lead found in the contact points of high voltage breakers, lead contaminated brass and bronze in the form of sprinkler heads and valves) in TAN-630 and TAN-650 were removed and managed in accordance with federal, state, and local regulations. Asbestos abatement was performed in both TAN-630 and TAN-650. Minor asbestos removal activities in TAN-630 and TAN-650 are currently on-going and will be completed prior to demolition.

Voluntary Consent Order (VCO) actions have been completed that addressed potential RCRA issues. These VCO actions are summarized as follows:

- Eighteen tank systems comprising 79 tanks located in TAN-630 and TAN-650 were identified as covered matters in the SITE-TANK-005 Action Plan of the VCO. All RCRA actions have been completed for these tanks and they have been moved to Appendix C, Covered Matters that are Closed. This includes the RCRA closure of VCO System TAN-020 and HTRE-III Mercury Contaminated Sumps (4 tanks), which was completed in 2005. The other 17 tank systems (75 tanks) were characterized as either RCRA non-hazardous or empty.

The HWMA/RCRA Closure Plan Addressing the HTRE-3 Mercury Spill at TAN/CTF (LOFT) (DOE/ID-11097, December 2004, Rev 4) was prepared to address the mercury spill that occurred in TAN-650. The tank system addressed in the closure plan and closed per the closure plan is identified as VCO Tank System TAN-020 in the SITE-TANK-005 Action Plan of the VCO. Closure activities also addressed units and ancillary equipment within TAN-650 that were contaminated by HWMA/RCRA hazardous constituents during decontamination and decommissioning of the Heat Transfer Reactor Experiment Number 3 (HTRE-3) test engine. Closure activities also addressed ancillary equipment that transferred chromated wastewater from the mobile test assembly shield tank during facility deactivation. The closure activities, which were completed in April 2005, addressed the following: residual waste removal; piping and ancillary equipment removal; decontamination of system components (i.e., filter sump and a portion of the upper containment vessel floor and peripheral trench that drained to the sump; condensate sump and the portion of the upper containment vessel floor that drained to the sump; pressure reduction and decontamination sump and associated embedded piping; and high level waste sump and its associated piping); and decontamination of secondary containment structures (i.e. test chamber concrete floor; containment vessel basement floor; portions of floor, walls, and ceiling in the containment vessel basement Room B-236; and the Room B-225 floor).

Deactivation activities are nearing completion in TAN-630. Any remaining units and equipment (e.g., industrial-sized boilers located in TAN-630) will be removed and disposed of during demolition. Deactivation activities are approximately 95% complete for TAN-650. Lead crimps on conduit in the upper containment vessel are in the process of being removed and disposed of in accordance with federal, state, and local regulations. The borated water storage tank located in the TAN-650 Tower will be removed during demolition of the TAN-650 Tower.

Upper surfaces of the interior walls of the upper containment building dome (TAN-650), the circular crane system, and the ventilation ducting along the east side of the containment dome have fixed radioactive contamination. These contaminated surfaces would be difficult to decontaminate due to the height above the floor of the containment dome and will be removed and sent to the ICDF for disposal under the EE/CA. The borated water storage tank, a 42,000 gallon tank, is located on the top floor of the TAN-650 tower. This radiologically contaminated tank will also be removed and sent to the ICDF for disposal under the EE/CA.

The only radioactive contamination that will remain is in the sumps and associated embedded piping in the TAN-650 lower containment. Radionuclide characterization for the piping and sumps was determined using analyses conducted by Phillips (2005) and embedded piping data summaries and sump area summaries provided by LOFT engineering staff. The following assumptions were used in the development of the radionuclide characterization:

- Contaminants are dispersed inside horizontal piping along the lower 50% of the length.
- Contaminants are dispersed inside vertical piping along the lower 50% of the length for conservatism. It is known that vertical piping is less contaminated than horizontal piping.
- The highest removable contamination level (i.e., 13,000,000 dpm/100cm²) for horizontal high-level waste sump piping was assigned to all of the TAN-650 piping, as a conservative estimate.

A total contaminated surface area for the embedded piping (i.e., bottom half of the piping) was determined to be $4.87 \times 10^4 \text{ cm}^2$. The radionuclide inventories for the sumps were also determined using the highest removable contamination level (i.e., 13,000,000 dpm/100 cm²) for high level waste sump piping, which is a conservative estimate based on characterization and process knowledge of the system since this sump held the highest levels of radionuclide contamination during the operations of LOFT. A total contaminated surface area for the sumps was determined to be $2.07 \times 10^6 \text{ cm}^2$. The radionuclide inventory for Year 2005 is shown in Table 1. The radionuclide inventory for Year 2095 is shown in Table 2. The total activity for 2005 is 0.155 curies. The total activity for 2095 is 0.018 curies.

Table 1. TAN-650 Year 2005 Radionuclide Piping and Sump Inventories.

Nuclide	Half-Life (yr)	% Abundant	Piping	Sumps	Total
			2005 Activity (Ci)	2005 Activity (Ci)	2005 Activity (Ci)
Ag-108m	130	0.0010	3.42E-07	1.21E-06	1.55E-06
Co-60	5.27	9.0000	3.08E-03	1.09E-02	1.40E-02
Cs-134	2.06	0.0043	1.47E-06	5.21E-06	6.68E-06
Cs-137 ^a	30.07	87.0000	2.98E-02	1.05E-01	1.35E-01
Eu-152	13.54	0.0100	3.42E-06	1.21E-05	1.55E-05
Eu-155	4.75	0.0066	2.26E-06	8.00E-06	1.03E-05
H-3	12.32	0.0062	2.12E-06	7.52E-06	9.64E-06
Sb-125	2.76	0.0900	3.08E-05	1.09E-04	1.40E-04
Sr-90 ^a	28.78	3.7600	1.29E-03	4.56E-03	5.84E-03
Zn-65	0.6675	0.1190	4.07E-05	1.44E-04	1.85E-04

a. Activities do not include progeny (i.e., Ba-137m and Y-90).

Table 2. TAN-650 Year 2095 Radionuclide Piping and Sump Inventories.

Nuclide	Half-Life (yr)	% Abundant	Piping	Sumps	Total
			2095 Activity (Ci)	2095 Activity (Ci)	2095 Activity (Ci)
Ag-108m	130	0.0010	2.12E-07	7.50E-07	9.62E-07
Co-60	5.27	9.0000	2.23E-08	7.91E-08	1.01E-07
Cs-134	2.06	0.0043	1.04E-19	3.70E-19	4.74E-19
Cs-137	30.07	87.0000	3.74E-03	1.33E-02	1.70E-02
Eu-152	13.54	0.0100	3.42E-08	1.21E-07	1.55E-07
Eu-155	4.75	0.0066	4.48E-12	1.59E-11	2.03E-11
H-3	12.32	0.0062	1.34E-08	4.76E-08	6.10E-08
Sb-125	2.76	0.0900	4.72E-15	1.67E-14	2.15E-14
Sr-90	28.78	3.7600	1.47E-04	5.22E-04	6.69E-04
Zn-65	0.6675	0.1190	1.07E-45	3.80E-45	4.87E-45

a. Activities do not include progeny (i.e., Ba-137m and Y-90).

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